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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Sang Jun Youn

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EXAMINER

DUCHENEAUX, FRANK D

ART UNIT

PAPER NUMBER

1788

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/599,523	<b>Applicant(s)</b> YOUN ET AL.	
	<b>Examiner</b> FRANK D. DUCHENEAUX	<b>Art Unit</b> 1788	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-10, 27 and 34-39 is/are pending in the application.
- 4a) Of the above claim(s) 27 and 34-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### **Continued Examination Under 37 CFR 1.114**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/16/2011 has been entered.

### **Examiner's Note**

2. The Examiner acknowledges the cancellation of claims 11-26 in the amendments filed 3/16/2011.

### **Response to Amendment**

3. Applicant's arguments, see page 6, filed 3/16/2011, with respect to the objection of claim 8 in the office action mailed 12/16/2010, have been fully considered and are persuasive. The objection of claim 8 has been withdrawn.

### **Specification**

4. The disclosure is objected to because of the following informalities: the Examiner notes that the use of "welt" through out the disclosure maybe a typographical error and was intended to recite "weft," which is a well established description in the textile art.

Appropriate correction is required.

### **Claim Objections**

5. **Claim 1** is objected to because of the following informalities: the Examiner notes that the use of “welt” in the claim maybe a typographical error and was intended to recite “weft,” which is a well established description in the textile art. Appropriate correction is required.

### **Rejections**

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### **Claim Rejections - 35 USC § 112**

7. **Claims 1-5 and 7-10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Regarding claim 1**, the Applicants’ attention is directed to paragraph 0036, wherein it is noted that the tapes or strands comprise 5-65% by weight and 35-95% by weight of reinforcing fibers and thermoplastic resin, respectively.

Thus, it is unclear from the limitations of the present claim whether the thermoplastic resin recited in “each of the plurality of tapes or strands have been impregnated with a

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thermoplastic resin prior to being aligned” is a different thermoplastic resin or the same resin being present in an amount of 35-95% by weight recited earlier in the claim.

8. **Claim 7** recites the limitation "the thermoplastic resin" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is noted that claim 1 recites “a center layer...containing thermoplastic resin” and “35-95% by weight of thermoplastic resin” and “impregnated with a thermoplastic resin prior.” Thus, it is unclear to which of the three recitations the resin recited in current claim 7 refers.

9. **Claims 1, 5, 7, and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1).

**Regarding claim 1, 5, 7 and 10**, Sakai teaches preparation of fiber-reinforced thermoplastic molded articles (title) comprising a laminate (column 9, line 47) of a plate material (center layer) essentially consisting of a thermoplastic resin and fibrous reinforcement (thermoplastic composite material), and a sheet (continuous layer) prepreg obtained by impregnating a unidirectionally arranged fiber with a thermoplastic resin (column 5, lines 9-13).

Sakai also teaches that said sheet prepreg is set up on either one or both of the surfaces (upper and lower surface) of the back of the plate material to provide an extremely remarkable increase in strength (column 5, lines 49-52), and said prepreg layer having a reinforcing fiber content of 30 to 90% by weight (column 4, lines 9-12) such as a content of 30 wt. % - and thereby 70 wt. % of a thermoplastic resin (Table 2, prepreg E and Example 8).

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Sakai continues to teach that prescribed numbers of the sheet prepreg are stacked (outermost prepreg sheet serving as a protective layer) in an arbitrary portion on the sheet material and that the sheet material is maintained above the flow temperature (melted) of the thermoplastic resin and then placed in a mold and pressed (adhered) for a short time to carry out foaming, defoaming and cooling and that the resin in the plate material is the same as that of the prepreg (column 5, lines 37-48).

Sakai further teaches that said plate material made of a thermoplastic resin with a fibrous reinforcement of a glass fiber (glass fiber-reinforced thermoplastic resin layer) (Table 1, plate material (b) and Example 8), and that suitable thermoplastic resins for the plate material include polypropylene, polyethylene, nylon, PET and polyphenylene sulfide (column 2, lines 40-48); and those resins exemplary for the sheet prepreg include polypropylene, polyethylene, nylon, PET and polyphenylene sulfide (column 3, lines 43-50).

The examiner notes that, while Sakai is specifically silent to a continuous reinforcing fiber-impregnated prepreg layer laminated on a at least one whole surface of an upper and lower surface of a center layer, as set forth above, Sakai does teach that sheet prepreg is set up on either one or both of the surfaces of the back of the plate material to provide an extremely remarkable increase in strength.

Although Sakai does not disclose a center layer prepared by melt-extruding, it is noted that “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the

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prior product was made by a different process”, In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Further, “although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product”, In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir.1983). See MPEP 2113.

Therefore, absent evidence of criticality regarding the presently claimed process and given that Sakai meets the requirements of the claimed composition, Sakai clearly meet the requirements of the present claims.

Therefore, it would have been obvious to one of ordinary skill in the art to provide the sheet prepreg layers on an entire surface of a plate material given that one of ordinary skill could easily distinguish the necessity of strengthening the whole surface or surfaces of the plate material over strengthening only a portion of a surface or surfaces of a plate material as in the present invention.

Sakai is silent to a continuous reinforcing fiber-impregnated prepreg layer comprising a plurality of tapes or strands that have been aligned to form welts and warps, and wherein each of the plurality of tapes or strands have been impregnated with a thermoplastic resin prior to being aligned.

However, Hsiao teaches core-crush resistant fabric and prepreg fiber reinforced composite sandwich structures (title) comprising a fabric (10) having a plurality of openings (16) by interweaving warp tow strands (12) and weft tow strands (14) (plurality, bi-directional structure) (para 0033, lines 1-3 and figures 1-4), wherein each tow strand is formed from a

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plurality of continuous filaments and fibers such as those made of high modulus reinforcing fibers such as carbon (natural), fiberglass and aramid (para 0034),

Hsiao also teaches suitable resin compositions for the polymeric matrix resins such as, inter alia, polyester and polyamides (para 0039, lines 1-11), said resin applied to the fabric such that the fabric is substantially impregnated and having a resin content of from about 20 to about 60 percent by weight based on the total weight of the prepreg, and the prepreg can further undergo other treatment such as calendaring or compaction to reduce the openness of the prepreg (para 0053).

Hsiao continues to teach that prepregs made with the interweaving tow strands greatly reduces the porosity (para 0074, lines 1-3).

Although Sakai and Hsiao do not disclose “tapes or strands have been impregnated with a thermoplastic resin prior to being aligned,” it is noted that “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process”, In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Further, “although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product”, In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir.1983). See MPEP 2113.



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Therefore, absent evidence of criticality regarding the presently claimed process and given that Sakai and Hsiao meet the requirements of the claimed continuous reinforcing fiber-impregnated prepreg layer, Sakai and Hsiao clearly meet the requirements of the present claims.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai and Hsiao references toward fiber-reinforced thermoplastic molded articles having continuous reinforcing fiber-impregnated prepreg layer constructed of high modulus fibers laminated on both sides of a plate material thereby providing the composite structure with reduced porosity as in the present invention.

10. **Claims 2 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Funakoshi (US 2003/0161989 A1).

**Regarding claims 2 and 8**, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Sakai also teaches that the content of fibrous reinforcement in the plate material is from 30 to 50 % by weight in view of reinforcing effects and flowability (column 3, lines 37-42).

Sakai and Hsiao are silent to fibers with an average length of 1-30 mm.

However, Funakoshi teaches a lightweight fiber-reinforced thermoplastic resin molding (title) comprising fibers of an average length of 2 mm to about 10 mm (para 0040) and that

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tensile and bending strength tend to be greater as the length of reinforcing fibers increases (para 0039).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Funakoshi references to provide a fiber-reinforced thermoplastic plate material having fibers in a percent weight as presently claimed and a length as presently claimed towards fiber-reinforced thermoplastic molded articles, wherein a plate material has an amount of fiber content sufficient to provide reinforcing characteristics while maintaining adequate flowability, said fibers additionally providing tensile and bending strengths commensurate with the application for which the articles are to be used as in the present invention.

11. **Claims 3 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Nagayama et al. (US 6749934).

**Regarding claims 3 and 9**, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Hsiao also teaches well known flow control agents, albeit added to the resins of the prepreg layer, to adjust the viscoelasticity of a resin composition such as inorganic particles (para 0041) such as, inter alia, calcium carbonate (para 0043).

Sakai and Hsiao are silent to a center layer comprising 15 to 30 % by weight of inorganic filler.

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However, Nagayama teaches an FRP molded article and method for producing the same (title), comprising a mixture of thermoplastic resin and reinforcing fibers (abstract) and a filler such as needle-like calcium carbonate (column 7, lines 43-47), wherein the needle-like filler content is 5 to 20 wt. % (column 8, lines 23-26).

Nagayama also teaches a fine filler, especially a needle-like filler, inhibits local molding shrinkage and irregular stiffness, which mitigates warping (column 8, line 67 and column 9, lines 1-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Nagayama references to provide the plate material with an inorganic filler material in an amount as presently claimed towards a fiber-reinforced thermoplastic molded article, wherein the viscosity of the resinous plate material can be controlled for processing of the fiber-reinforced thermoplastic molded article, and which is less susceptible to local shrinkage of the mold and irregular stiffness and provides a molded article with diminished warping and thereby an article with improved aesthetic appearance as in the present invention.

12. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (US 5294394) in view of Hsiao et al. (US 2002/0009935 A1) and in further view of Bassett et al. (EP 0945253 A2).

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**Regarding claim 4**, Sakai and Hsiao teach the fiber-reinforced thermoplastic molded articles as in the rejection of claim 1 above. Hsiao also teaches well known flow control agents, albeit added to the resins of the prepreg layer, to adjust the viscoelasticity of a resin composition such as organic particles (para 0041) such as, inter alia, cellulose (para 0043).

Sakai and Hsiao are silent to a center layer comprising 20-40 % by weight of wood flour and chaff.

However, Bassett teaches a filled composite material (title) comprising a polyolefin, glass fibers and filler (abstract), wherein said filler is a wood flour (para 0019, lines 1-2) with a content of 20 to about 40 % by weight of the composite (para 0036, line 3). Bassett also teaches that wood flour can be used for cost reduction of the composite materials.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Sakai, Hsiao and Bassett references to provide the plate material with an organic filler material in an amount as presently claimed towards a fiber-reinforced thermoplastic molded article, wherein the viscosity of the resinous plate material can be controlled for processing of the fiber-reinforced thermoplastic molded article, and which is less expensive to produce as in the present invention.

### **Response to Arguments**

13. Applicant's arguments, see pages 6-8, filed 3/16/2011, with respect to the rejection of **claims 1, 5, 7 and 10** over Sakai et al. in view of Hsiao et al. under 35 U.S.C. 103(a); the

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rejection of **claims 2 and 8** over Sakai et al. in view of Hsiao et al. and in further view of Funakoshi under 35 U.S.C. 103(a); the rejection of **claims 3 and 9** over Sakai et al. in view of Hsiao et al. and in further view of Nagayama et al. under 35 U.S.C. 103(a); and the rejection of **claim 4** over Sakai et al. in view of Hsiao et al. and in further view of Bassett et al. under 35 U.S.C. 103(a) have been fully considered but they are not persuasive.

The Applicants argue that Sakai and Hsiao fail to contain all the elements of the claimed invention, and therefore cannot render obvious the pending claims, given that the prior art references fail to teach the amended limitations in currently amended claim 1.

The Examiner respectfully disagrees with the Applicants' argument and directs the Applicants attention to the prior art rejections set forth above, wherein it is clearly described how the Sakai/Hsiao combination teaches all the limitations of claims 1, 5, 7 and 10, and wherein Sakai/Hsiao in further combination with the employed tertiary references teaches the limitations of the additional respective claims.

Specifically, it is noted that, while Sakai/Hsiao are silent to the each of the plurality of tapes or strands have been impregnated with a thermoplastic resin prior to being aligned, Sakai/Hsiao clearly teach a plurality of the aligned wefts and warps as currently claimed, absent evidence of criticality regarding the presently claimed process of impregnating the tapes or strands prior to aligning said tapes or strands in a weft/warp configuration, Sakai/Hsiao clearly meet the requirements of the present claims.

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### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK D. DUCHENEAUX whose telephone number is (571)270-7053. The examiner can normally be reached on M-Th, 7:30 A.M. - 5:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alicia A. Chevalier can be reached on (571)272-1490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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4/6/2011